An Assessment of the Role of Computer Aided Design (CAD) in the Fashion Industry

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Abstract:- The invention of computer has changed the ways man conduct his day-to-day activities across the world. Virtually the activities of every field of human endeavor, including the clothing industry, have been automated. In this research work, we reviewed various publications in order to assess the role the computer has played in the industry. We found that despite few challenges the Computer Aided Design is of immense use to the clothing industry as it has the potential to radically ease production, reduce cost and increase profit margin.

I.   INTRODUCTION

The advent of computer system has revolutionized the way tasks are performed and how businesses are conducted in virtually every industry around the world. Hence, Computer emergence has led to new technology which have been applied to deal with challenges which has impeded the commerce, industries and several areas of human activities including the textile industry. According to Williams & Agbo (2013), there is hardly any aspect of human activity presently that has not been influenced by the impressive changes in information and communication technology (ICT) for the past 10-15 years. Suffice, therefore to say Computers have brought about incredible innovations in many areas of our socioeconomic as well as techno economic infrastructure. Clothing and textile industries are no exception. The fashion and textiles industries have helped most developed countries, such as China, France, and the United States of America, grow their economies (Biney-Aidoo &Antiaye, 2013). When given the proper attention, the fashion and textile industry can be a powerful economic force in a country's growth. However, due to increasing population and hence higher demands, the fashion industry is rapidly evolving, presenting apparel and clothing businesses with both opportunities and challenges. Traditional inefficient handwork cannot meet the high standards demanded by modern apparel production's rapid evolution. As a result, apparel businesses that want to succeed in the industry should adopt foreign market trends, use cutting-edge technology, invest in talent development, and upgrade their manufacturing facilities. Therefore, the computerizations of the processes are inevitable for their sustainable development (Cheng & Cheng, 2012).

II.   COMPUTER AIDED DESIGN (CAD)

Computer Aided Design or Drafting is the integration of techniques of computer science for engineering and technical design or modeling. This entails the use of hardware and software to either create or modify or analyze or optimize a 2 dimensional (2D) or 3 dimensional (3D) product design or models in order to minimize labor, time, cost, raw materials etc(Andotina, 2016)

CAD software is used to increase design efficiency, improve design quality, improve communications through documentation, and build manufacturing databases. Simply put, Computer Aided Design (CAD) is the use of a computer in any profession to manipulate the design of graphics and mathematical representation within the computer using specific software and hardware. CAD has effective tools which aid ingenuity and visualization. Furthermore, CAD is used in a variety of fields, including electronic design, fashion design, and other fields that depict the drawing process using computer software. (Leach, 2002) also mentioned that CAD is a tool that can be used for design and drafting activities, as well as making rough concept sketches, but it is better suited for producing accurate finished drawings. (Adwoa et al., 2013) indicated that CAD is used as a tool by engineers and designers to perform various tasks depending on the specific profession. As a result, there are several different types of CAD software that can be used to design curves and figures in two-dimensional (2D) space, as well as curves, surfaces, and solids in three-dimensional (3D) space. There are many different forms of CAD, each requiring the operator to think about how to use them and design their virtual components in a unique way. As a result, each one is appropriate for a particular task (Adwoa et al., 2013), (Sayem et al., 2010). Some examples include;

➢ Autodesk's commercial CAD software titles include AutoCAD, 3ds Max, and Maya.
➢ Blender is a free CAD, animation, and image processing software.
➢ Sketchup is a Google-developed proprietary web application that runs in a web browser.

III. THE CLOTHING INDUSTRY

Until the 1980s when the fashion production processes witnessed the debut of computerization into parts of its activities the industry has operated on a manual mode for several centuries. Conventionally, the processes of attire manufacturing entail idea generation, pattern making, pattern grading, marker making etc. Idea generation is the phase where the concept of what is to be produced and for whom is conceived. The design ideas are guided by the artistic expertise of the designer who is saddled with the duty. Therefore, the designer has to initiate the design concept or try to translate the ideas of the retailer into sketches and thereafter render them into feasible designs. Also in order to gain the approval of the retailer or buyer he has to produce several swatches of the same designs thereby resulting in wastages of raw materials. In addition, the buyer may live quite a lot of distance from the producer, as it is in most international transactions; hence huge cost has to be incurred to transport the samples for consideration. This means the samples are prone to damages and/or total loss in transit. The manual method is also characterized by difficulties in modification of designs, wastages of storage spaces, delays etc. All these leads to more labor cost, increased overhead cost in production and therefore a reduction in overall profit margin. This was putting enormous pressure on the manufactures to do the same process in lesser lead time. Lead time has been shrinking a lot (Kumar, 2012). With

To maximize profit, a fashion designer must develop his or her ability to manufacture and sell domestically as well as internationally in order to achieve corporate goals, which will eventually translate into national goals. Garment quality can be improved with CAD tools, allowing companies in the industry to capitalize on business opportunities. Since CAD is so quick and simple, it can help you improve productivity.

IV. CAD IN FASHION TECHNOLOGY

Fashion Design Technology is the creation of skills to identify and generate ideas, as well as to investigate the production of clothing and accessories; it is a critical role played by the fashion designer. As a result, according to Aldrich (1997), a fashion designer's position can involve everything from forecasting or generation of the next season's variety to pattern cutting and accountability for the finished sample. Clothing technology, Textiles technology, and Fashion illustration are the three main areas of fashion design that must all be used with CAD.

In 1987, Computer Aided Design (CAD) made its debut in the fashion industry, where it was used to design equipment and machinery. Computer-aided design, or CAD software, has become one of the most important tools in the clothing industry for pattern making and related work. It's used for pattern development, pattern grading, and marker creation. With the numerous types of CAD software in the market the operators can bring their creativity to conspicuousness and work differently to produce virtual

components of varying specifications to the delight of fashion enthusiasts. (Andotina, 2016) observed that the new fashion computer technology is used in the development of prototypes by means of a digital design laboratory with digital textile printing, 3D body scanning, and garment knitting; fashion design studio with draping, CAD for 2D and 3D design.

(Kazlacheva, 2005) states that CAD systems is very useful in designing, constructing and modeling of garments at higher speed and with greater accuracy. In CAD system, the fashion design industry is very explicit with its variety of drawing and modification tools. CAD involves the intersection of three sets, geometric modeling, computer graphics and design tools, based on their constituents (Zeid, 1991)

Fashion design technology finds great use for CAD. With the aid of the appropriate software, the computer can be used to make the desired design from the scratch, with colors and textures. Apparel designing, pattern making/grading, fashion illustration, and accessory design are vital needs of fashion designers that are adequately met by software such as Gerber, Lectra polygon, Apparel Computer Aided-Design (CAD), Snap Fashun, CADTERNS, CAD Fashion, Fashion Computer Aided-Design (CAD), Design concept 3D, Assyst Bullmer, Investronica, and APS-ethos embroidery software. Though some of these software may not be easily available in some regions and experts to operate them are also scarce some easily available and easy to use CAD software are; AutoCAD, CorelDraw, Illustrator and Photoshop (Andotina, 2016).

Nowadays, the apparel industry prefers to use computer-aided design (CAD) techniques for both fashion design and pattern production because it offers more efficient and time-saving solutions to many complex tasks, as well as making Internet-based communication between designers, manufacturers, and retailers easier (Sayem et al., 2010). Other significant roles CAD plays in apparel and textile industry include mass customization, development of more designs, efficient storage, frequent changing of styles and production, make work easier by providing competent and higher-quality products (Sayem et al., 2010), (Haque & Khan, 2017). Hence, by means of CAD application we can design and develop garments patterns quickly and precisely *. Also, by means of these software programs these patterns are rearranged in such a way that marker generation i.e., fabric utilization becomes maxima. In other words, we can say that by using CAD we can do pattern related activities very quickly, precisely and reduce wastage of fabrics. Therefore, the use of CAD is directly related to the reduction of garments cost.

V. MERITS AND DEMERITS OF CAD IN THE INDUSTRY

In the apparel industry, computer-aided design, or CAD software, has numerous advantages. It is a game-changer in the ready-to-wear fashion export industry today. In this section we review few the advantages and disadvantages of using Computer Aided Design in the industry.

5.1 Merits of CAD in the industry

The following are some of the key benefits of computer-aided design (CAD) in the readymade apparel industry:

i. **Ease of modification**; CAD is more favorable in quick changes to any design because without significant delays or cost increases, the entire design can be easily personalized and configured in a short period of time. (Adwoa et al., 2013).

ii. **Saves time;** it is possible to use more application on garments therefore In comparison to the time-consuming manual design methods, the CAD system saves time. (Wambui & Sc, 2012)(Kaystha & Sharan, 2017).

iii. **Provide convenience in storage;** Another significant advantage of CAD software in the garment manufacturing industry is that designers no longer need to constantly create different swatches for different colors because they can now see how a specific fabric or apparel appears in various shapes and colors on the computer screen. Digital swatches can also be stored on zip disks, floppy disks, hard drives, or CD-ROMs, saving space. (Wambui & Sc, 2012).

iv. **Simplify transmission/transportation;** via electronic files, all concept data can be easily processed, distributed, and transported. This means that, in addition to the CAD software's storage advantages, the virtual sample created by the CAD can be sent to the buyer via email or other appropriate electronic media, allowing them to track and manage the designs, while physical samples must be sent via courier, affecting time, protection, and cost.(Chen, 2016)(Kaystha & Sharan, 2017).

v. **Saves labor and time cost;** The manual method needs more labor and time in grading different sizes patterns and making arrangements prior to marker making process, hence the CAD technique has the advantage of reducing time and labor (Wambui & Sc, 2012).

vi. **Ensure accuracy and productivity**; Using CAD, we can design and develop a pattern very quickly with minimum incidence of faults. The quality of CAD based patterns are superior to that obtained manually (Haque & Khan, 2017).

Summarizing all the facts it is expected that CAD is very useful for the industry,as against the physical sample approach of the manual method because the virtual sample making through CAD allows easy modification, simple transmission of design, saves labor and time, reduces cost and fabric thereby raising the profit margin.

5.2 Demerits of CAD of CAD in the industry:

While it is rare to find relative drawbacks of CAD application in the apparel industry, some CAD experts from this industry have identified some minor challenges. (Adwoa et al., 2013) noted that some of the challenges are:

i. The prices of some of the most common CAD applications, such as Page CAD, QCAD, Libre CAD, and Open SCAD, are higher.

ii. CAD operators must upgrade their skills in order to keep up with the latest CAD software.

iii. Finding a professional operator to run CAD software can be difficult at times.

VI. CONCLUSION

Fashion Design has transited through stages from traditional to computerization. The fashion industry has benefited from the implementation of computer-aided design systems, which have removed the time-consuming labor of manual pattern drafting and grading, layout construction, and written information relocation. Furthermore, in order to reduce product costs and improve competition, the fashion industry must automate a variety of processes. Because of its ease and precision in designing and drafting, CAD is becoming increasingly popular. Unique drafting methods are being used, and design calculations are simpler and accurate. These significant benefits of computer-aided design must be fully utilized in fashion design in Nigeria in order to increase production efficiency, profit, and international competitiveness.

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